European Research Policy for Environmental Risk and Emergency Management

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European Commission

- **Largest of the EU institutions**
  - Propose and implement EU policies

- **Made up of «Directorate Generals»**
  - Policy DG's and Research DG's
  - The EC supports EU R&D via its « Framework Programmes »:
    - every 4 years (now in FP6 ~ 17.5 Billion €)
    - R&D in support of EU policies & EU RTD policy (ERA)

- **DG INFSO – promoting European research in Information & Communication Technologies (ICT)**
  - Environmental risk & emergency management !
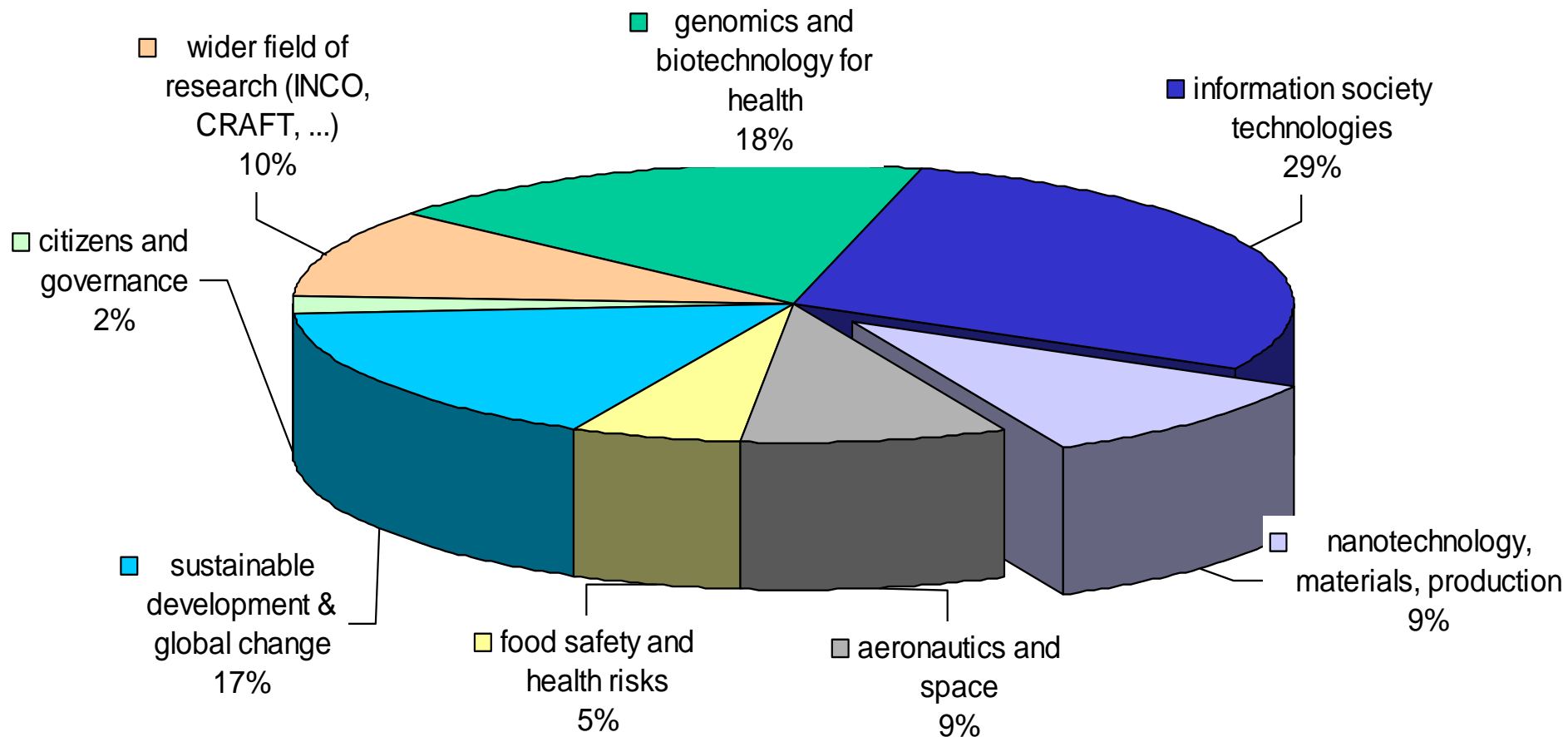
- **EU's 6th Environmental Action Programme & EU SD Strategy**

- **Civil Protection Community Action Program**
  - flood, fire, earthquake, landslides, marine pollution…
  - early warning, alerting the population, crisis management, emergency communication

- **Development & Humanitarian aid, solidarity & cohesion funds, Common Foreign and Security Policy (CFSP)**

- **Initiatives: INSPIRE, GMES, GEOSS …**

EU Research

- **International & multidisciplinary research consortia, encouraging industrial & end-user involvement**

- **Through RTD projects: ie: « Integrated Projects » & « Networks of Excellence »**

- **Support for traditional projects, conferences, workshops, publications, fellowships, etc.**

- **Via specific « Calls for proposals »**
  - See RTD INFO magazine:
    http://europa.eu.int/comm/research/rtdinfo/index_en.html

Eight R&D Priorities of FP6

- genomics and biotechnology for health 18%
- information society technologies 29%
- nanotechnology, materials, production 9%
- aeronautics and space 9%
- food safety and health risks 5%
- sustainable development & global change 17%
- citizens and governance 2%
- wider field of research (INCO, CRAFT, ...) 10%

- **To promote the development of cost-effective sustainable services**
  - Technology integration – solution driven
  - Specific technological developments
  - Market & user needs driven
    - Focus on generic solutions
    - Re-usable software components
    - Open source software
    - Interoperability, scalability
  - Based on state-of-the-art scientific knowledge

Disaster Management Cycle

Preparedness
- Scenarios development
- Emergency Planning
- Training

Prevention and Mitigation
- Hazard prediction and modeling
- Risk assessment and mapping
- Spatial Planning
- Structural non structural measures
- Public Awareness & Education..

Alert
- Real time monitoring & forecasting
- Early warning
- Secure &dependable telecom
- Scenario identification
- all media alarm

Response
- Dispatching of resources
- Emergency telecom
- Situational awareness
- Command control coordination
- Information dissemination
- Early damage assessment
- Emergency healthcare

Post Disaster
- Lessons learnt
- Scenario update
- Socio-economic & environmental impact assessment

Reconstruction
- Spatial planning
- Re-establishing life-lines transport &communication infrastructure
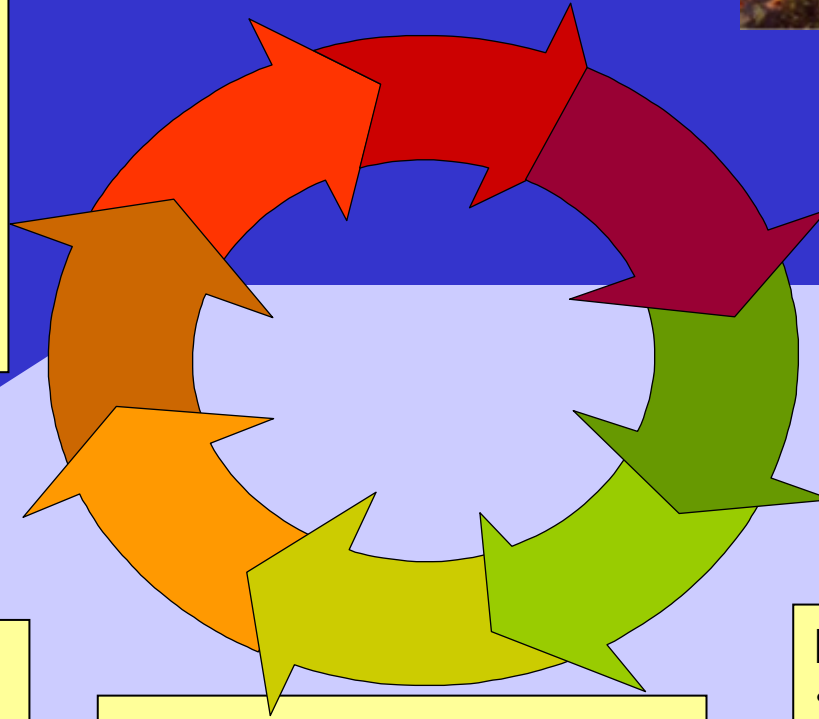
- Risk management is not yet a well organized discipline
- No clear methodology to handle inter-related risks
- Many (potential) service providers do not understand operational needs
- Unclear organizational responsibility for information generation
- Incompatible information systems
- The access to relevant data is not easy
- The current offering is incomplete and technology push could be beneficial

Rationale for Action

- **Why invest in Risk Management?**
  - Steep increase of natural & industrial disasters
  - Early warning, emergency telecoms, DSS, public info
  - CPA poorly equipped, lack of interoperability
  - EU role in peacekeeping & humanitarian crises

- **Criteria for R&D investment**
  - will R&D open up new markets?
  - will the EU industry benefit?

- **Technology integration & specific technological developments**

    - Robust and Smart sensors with communication and location capabilities : sensor web
    - Advanced modelling & simulation, high performance computing
    - Decision support & visualisation tools, GIS, HPC
    - Development of distributed C4
    - integrate earth observation data (SAT & HAPS) with in-situ data
    - Knowledge management (learning organisation)

Ongoing FP6 Integrated Projects:

- **Risk information infrastructure and generic services:**
  - Distributed computing, workflow management, collaborative working, language issues, ground segment interface; open architecture, thematic applications support, web services, ontology, generic services (ORCHESTRA & WIN) www.eu-orchestra.org & www.win-eu.org
- **Emergency management:**
  - C3 systems, positioning systems, situational awareness, emergency telecom (OASIS) www.oasis-fp6.org
   - Command & control system to support response & rescue operations in large scale emergencies

- **Risk-specific applications to populate the common information and service system**
  - Integration of RTD results

- **Improved monitoring capabilities**
  - Sensor web
  - HAPS, …

- **Faster than « real time » models**
  - Grid computing

Future Technologies

- **Broadband telecom for PPDR**
- **High altitude platforms for:**
  - monitoring oil spills
  - forest fires
  - flood
  - traffic
  - emergency telecom backhaul

- **UltraWide band Radio for positioning and communication for emergency situation**

- **Smart sensors & sensor Web architecture**
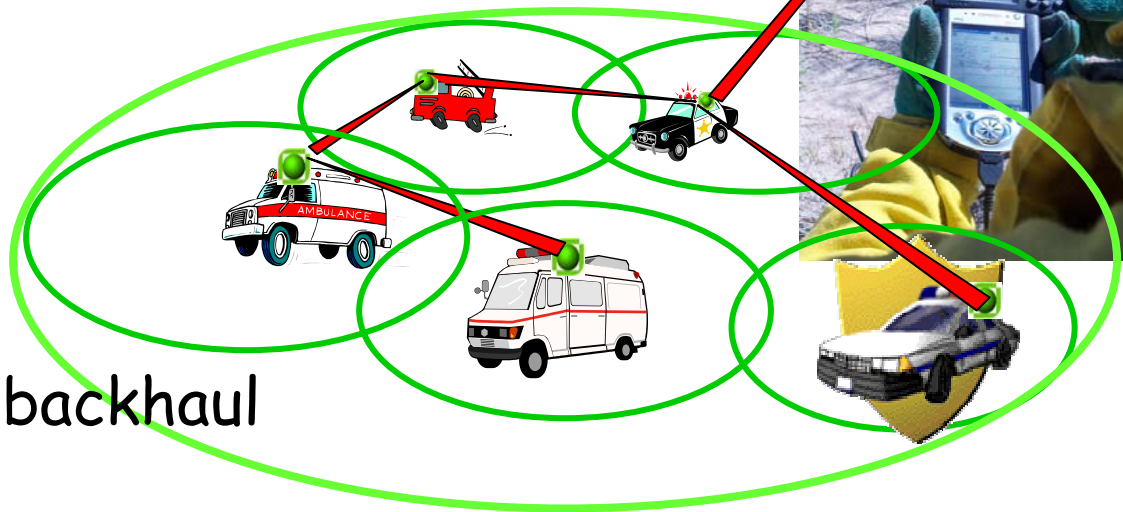
Aim of Call 5

IST Call 5: (SO 2.5.12): 17/05/05 – 21/09/05

To overcome the market fragmentation by developing systems & services relevant to risk & emergency management which are:

- Interoperable
- Open
- Evolutionary
- Adaptive
- Applicable to cross border operations

Approx. Budget 40 million €

Focus: on risks leading to emergencies and/or environmental crises such as natural hazards or industrial accidents.

Aim: To overcome the market fragmentation by developing systems & services relevant to the environmental risk/crisis mgt, which are:

- Interoperable
- Open
- Evolutionary
- Adaptive
- Applicable for cross border operations.

Considering possibly dual use of systems and components

1. **In-situ monitoring – contrib. to GMES (IP & STREPs):**
   – Systems and services
   – Smart sensor networks, terrestrial and M-HAP or UAV:
      - measurement platforms
      - communications backhaul during crisis operations.

   Based on:
   – Clear end-user requirements
   – State of Art and emerging technologies
   – Cost/benefit analysis

2. **RTD on public safety communication (IP & STREPs):**
   – robust, secure and computerised alert systems;
   – communication to and from the citizen and
   – rapidly deployable emergency telecommunications systems.

   Considering:
   – Safety needs of personnel in the front line;
   – Enhanced international response to major disasters;
   – Communication and positioning also indoors

3.   **Support Actions (SSA/CA) to achieve full interoperability by:**

- extending on-going work on risk and emergency mgt to the broader scope of environmental degradation;

- appropriate mechanisms to support early adoption of a common GMES information and service architecture;

- supporting the convergence effort in the field of public safety communication.

Call 6 – in the making!

- IP - to develop, validate and demonstrate a distributed tsunami early warning and alert system, relevant to Europe & Indian Ocean.
  - enabling strong collaboration and interoperability across the whole disaster-reduction cycle.
  - based on the integration of advanced ICT systems and services, including: data exchange & fusion technologies, computational scenario-building, real-time forecasting, advanced detection through GRID-enabled computing & GEANT-type collaborative networking, interfacing with DSS, and all media broadcasting & telecoms.
  - Validation environments need to be established for testing prototype integrated systems and services

- TEWS Workshop – Brussels 12th May 2005

Workshops & Events 2005

- Tsunami Early Warning and Alert Workshop: 12th May, Brussels
  - To prepare contents of a dedicated Call 6

- GMES architecture Workshop: 13th June, Brussels
  - INFSO contribution to GMES
  - Data integration and information management (GMES Action Plan 2004-2008)
  - To be validated on risk management applications

- INTERSCHUTZ: EU Research Conference, 8-9 June, Hannover

- ENVIRONIFO: FP7 session on Envoroinformatics, 6-7 Sept. Brno

International Cooperation:

- Third country participation as a « cross cutting » issue concerning the whole WP
- Specific measures in support of Int. Coop.
- International mobility of researchers:
    - –Incoming fellowships & Outgoing fellowships

INCO target countries:

- **Mediterranean (8), developing countries (14), Western Balkans (5), Russia & NIS (12).**

- **Countries with S&T agreement:** Australia, Canada, Japan, <u>USA</u>

- **Countries without S&T Agreement:** if « essential » to carrying out the project

Note: candidate countries, EFTA, EEA, TK, IL, BU, RO are treated like MS!

US - National Science Foundation (NSF) & INFSO

- Pilot Phase 1 – NSF has set aside a budget of 1 M$ for cooperation between NSF grantees & 11 EU projects:
  - **embedded systems**
  - **e-health**
  - **e-government**
  - **trust & security**

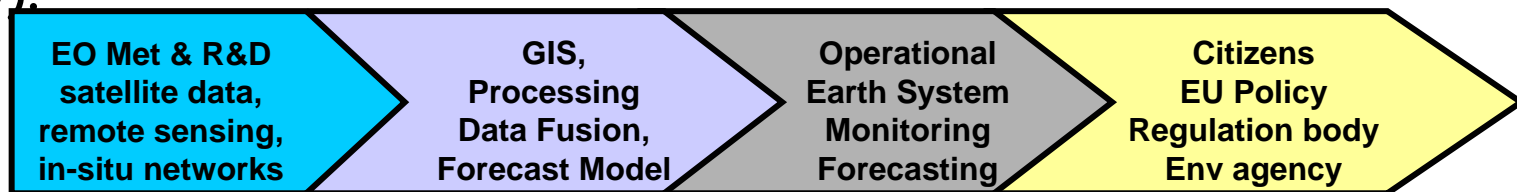 Next pilot phase (2) – Summer 2005

- Bilateral agreement between project partners, who decide on tasks and IPR rights

DM links-other services & initiatives

EU-MEDIN

DG INFSO

DG RTD

FP R&D

JRC

DG TREN

GMES

ESA

DG ENV

INSPIRE

EEA

International context

DG RELEX

DG ECHO

UN OCHA

UN ISDR

GEOSS

EU RTD context

EU Policy context
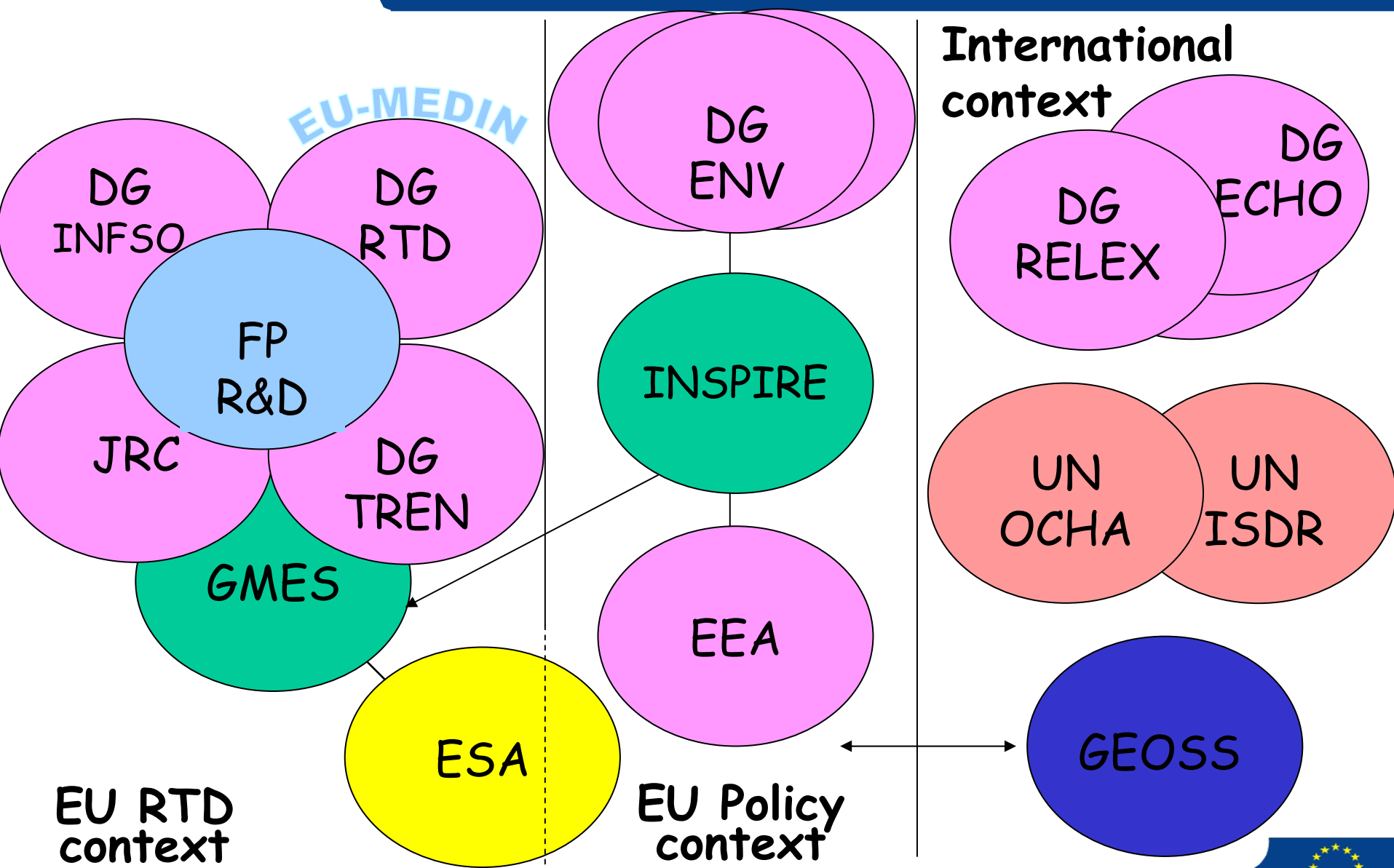
GMES – initiative of EC & ESA

- Co-ordinate and enhance existing EO & monitoring capabilities in order to support improved decision making on issues of environment and security;

-Transition from research-driven (EC FP6/FP7, ESA) to pre-operational GMES activities to fully operational services (2004-2008).

EO Met & R&D satellite data, remote sensing, in-situ networks	GIS, Processing Data Fusion, Forecast Model	Operational Earth System Monitoring Forecasting	Citizens EU Policy Regulation body Env agency

- Make the end-to-end EO value chain more <u>effective</u> by:
• Delivering information (not data) to end-users (ie: tactical/strategic)
• Organising the supply
• Federating the demand (ie: user-pull, not technology pushed)
• Establishing a sustained dialogue with end-users (ie:. policy body)

GEOSS - objectives

GEOSS-Global Earth Observation System of Systems:

- Distributed system of systems, building on current co-operation efforts among existing observing and processing systems within their mandate, while encouraging and accommodating new components:
  - Acquiring observational data from all different EO platforms;
  - Processing data into useful products;
  - Exchanging, disseminating and archiving shared data, metadata and products;
  - Undertaking activities to continue EO related Research, capacity building and outreach.
- 9 societal benefit areas including natural & human-induced disasters

GEOSS (Global Earth Observation System of Systems):
- 10 Year Implementation Plan starting in 2006
- Int'l initiative @ ministerial level w/ particip. of 55 countries & 43 Int'l Organisations & EC
- EU Contribution:
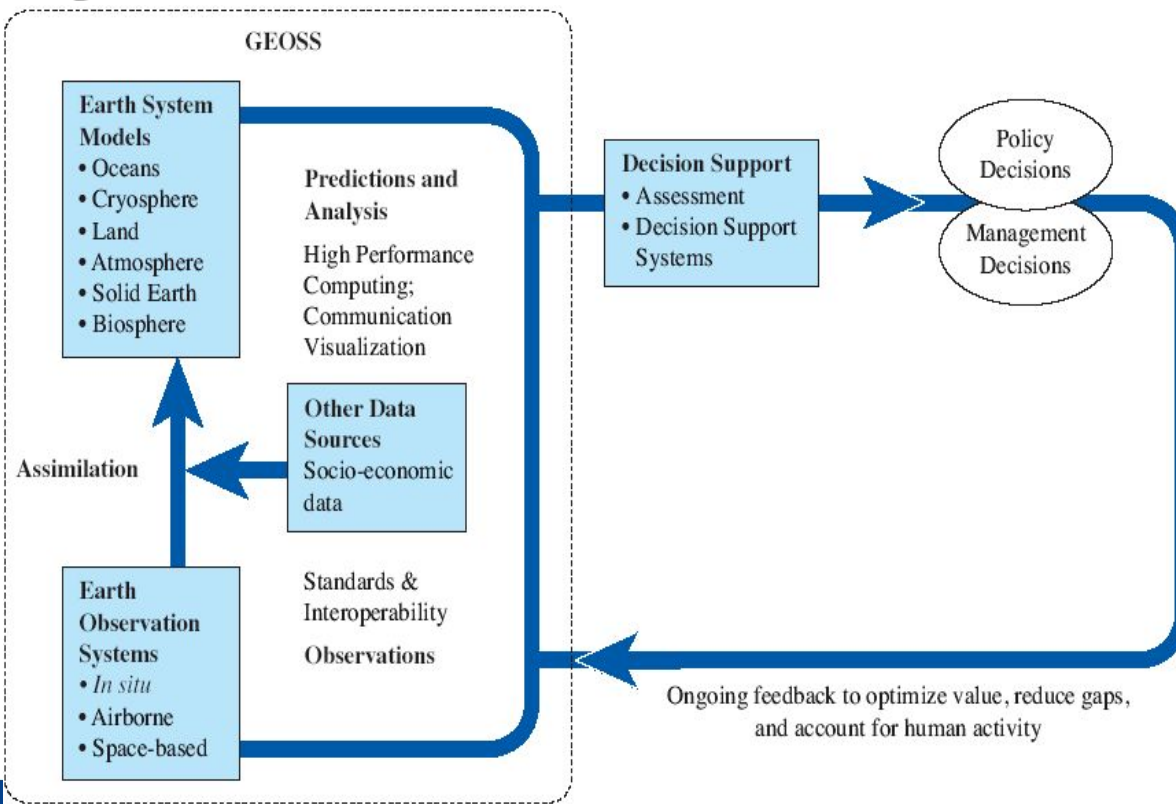
- Role as Co-Chair in GEO

- Via GMES

- EU Regional and national Earth Observation networks

- EU supported R&D (FP6 and FP7) addressing GEOSS societal benefit areas (including disasters)

GEOSS

Earth System Models
• Oceans
• Cryosphere
• Land
• Atmosphere
• Solid Earth
• Biosphere

Predictions and Analysis
High Performance Computing; Communication Visualization

Decision Support
• Assessment
• Decision Support Systems

Policy Decisions

Management Decisions

Assimilation

Other Data Sources
Socio-economic data

Earth Observation Systems
• *In situ*
• Airborne
• Space-based

Standards & Interoperability

Observations

Ongoing feedback to optimize value, reduce gaps, and account for human activity

INSPIRE Initiative

• EC initiative on use of Geographical Information in Europe as a contribution to environmental policy & Sustainable Dev.

• EC COM(2004) 516, 23.7.2004 proposes a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE)

INSPIRE objectives

Make relevant, harmonised spatial data available for Community Environmental Policy (formulation, implementation, monitoring and evaluation - *Art. 175(1)*) and for the citizen ...

... through the establishment of integrated spatial information services, based upon a distributed network of databases, linked by common standards and protocols to ensure compatibility.

Geographical information should be:

- collected once and maintained at the appropriate level;
- seamless;
- shared;
- available;
- easy to find and access;
- presented in an understandable visual form.

- Theme on "natural disasters"

Euro-Mediterranean Disaster Information Network

• Initiative of EC to promotes the sharing of disaster-related information and data, research, results, knowledge and expertise. The Initiative aims at harmonising methods to improve pre-disaster planning as well as hazard, vulnerability and risk assessments.

•Disaster themes: forest fires, storms, floods, earth-quakes, volcanoes, landslides, avalanches & technological hazards, ICT for DM, etc.

EU projects, metadata on project results, events, who's is who in the EU disaster science community

Have a look!

- New package for FP 2006+

- Research, innovation and competitiveness are top policy priorities

- ICT: Essential component of two key proposals

  - FP7: The ICT theme and ICT-related infrastructures

  - The CIP: ICT Policy Support Programme

  - Two complementary financial instruments, one policy goal:

    - *« Enable Europe to master and make the best use of ICTs »*

- **Continuity**
  - Thematic priorities
  - Scaling up ERA coordination actions
  - Scaling up Marie Curie actions
  - Scaling up SME measures
- **Seven years duration**

- **New Impetus**
  - Doubling of budget per year
  - European Research Council
  - Joint Technology Initiatives
  - New research infrastructures
  - Mainstreaming NEST/FET, SSP/Priority8, Int'l Cooperation
  - New management schemes

FP7 Structure

"Cooperation"

Predefined themes, refined FP6 instruments 44735 m€ (61%)

"Ideas"

Frontier research, competition, individual grants 11942 m€ (16%)

"People"

Human potential, mobility 7178 m€ (10%)

"Capacities"

Infrastructure, SMEs, science and society, 7536 m€ (10%)

Joint Research Center – non-nuclear 1824 m€ (3%)

+EURATOM

Cooperation" – Collaborative RTD

Nano, materials, production: 4865 m€ (11%)

Energy: 2951 m€ (7%)

Environment: 2552 m€ (6%)

ICT: 12756 m€ (28.5%)

Transport: 5981 m€ (13%)

Food, agri, biotech: 2472 m€ (6%)

Socio-econ research: 798 m€ (2%)

Health: 8373 m€ (18%)

Space and security: 3987 m€ (9%)
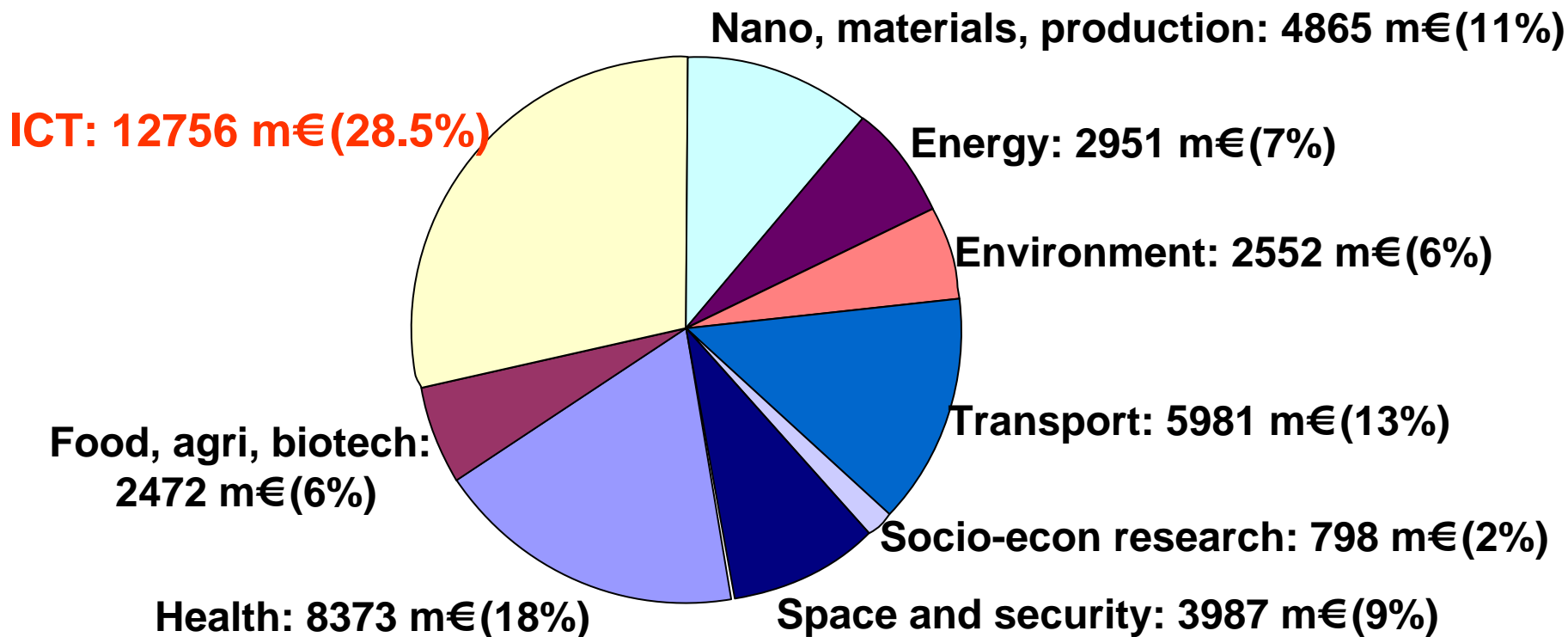
- **"To enable Europe to master and shape the future developments of ICT so that the demands of its society and economy are met"**

- **Main thematic areas:**
  - ICT Technology Pillars
  - Integration of Technologies
  - Applications Research:
    - ICT meeting societal challenges for health; to improve inclusion; for mobility; in support of the <u>environment</u>; for governments
  - ICT meeting societal challenges
    - for health; to improve inclusion; for mobility; in support of the environment; for governments

ERC – European Research Council

Commission

- Approval of work programme, as defined by the Scientific Council

- Instruction to implement work programme

- Approval of annual implementation report

- Information to programme committee

Scientific Council*

- Preparation of work programme
- Set up of peer review: pool of reviewers, nomination of review panels, evaluation guidelines
- Oversight of the evaluation procedure
- Annual scientific report

Externalised tasks**

- Information and support to applicants
- Reception / eligibility of proposals
- Organisation and execution of evaluation
- Selection decision
- Scientific and financial follow-up of contracts
- Annual implementation report

ICT For the Environment

- Need to stimulate the development of suitable user-centred systems and tools for data and model integration, as well as overall decision support tools in order to avoid patchy and fragmented implementations lacking focus and interoperability:

- Thematic areas:

1. **Ecological and natural resource management**, mitigation and adaptation to long term environmental change (including global change and bio-diversity):
   - Pollution detection and monitoring of substances harmful to the environment and health (ie: including use of biosensors and nanotechnologies);
   - Management, decision support, optimisation and process control (ie. adaptation to climate change, agriculture and rural development, waste treatment and waste water treatment sewage simulation, irrigation, etc.)

2. **Assessment of human exposure to environmental stresses** (ie: in air, water, soil, industrial environment), in line with health/safety and environment policies.

3. **Disaster risk reduction** and ensuring better protection of people, environment and property, in the event of natural disasters and industrial accidents, including multiple and systemic risks:
   - Prevention: risk assessment and management, mitigation and adaptation, urban and rural planning and their impact on environmental risks, hazard forecasting, risk perception and communication;
   - Response: emergency preparedness, management and rescue operations, early warning, alert systems;
   - Post –disaster damage assessment and recovery.

ICT For Environment

- **Environmental and risk-based monitoring (data collection and information management)**
  - Real time data discovery and integration
  - Sensor network architecture
  - Mobile mapping techniques (land based , airborne and space-borne)
  - Multi-resolution, multi-topology data management
  - Data archiving and data legacy
- **Environmental and risk management systems**
  - Advanced geo-spatial modelling techniques
  - Techniques for highly distributed processing and modelling
  - Information systems for planning, decision support and optimisation
  - Knowledge systems for browsing and analysis in distributed environments
  - Semantic based engines for environmental data search and analysis
  - Simulations and scenario development (single and systemic risk)
  - Vulnerable assets mapping and rapid update
- **Emergency management, early warning and alert systems**
  - Innovative positioning technologies including 3D indoor positioning and mapping
  - Robotics for rescue operation in dangerous environment
  - Portable, distributed ad-hoc broadband communication for disaster management
  - Virtual and augmented reality for disaster response planning
  - 3D data structure and standards for emergency data management exchange standards
  - Geo-ontology and semantics for emergency response
  - Risk perception in stressed environment
  - Automatic, dependable end to end alert systems
  - Risk awareness and public safety communication

IST website:
> http://europa.eu.int/information_society
> http://www.cordis.lu/ist/
> Mailbox: INFSO - G5@cec.eu.int

GMES: http://www.gmes.info/

INSPIRE: http://www.ec-gis.org/inspire/

EU-MEDIN: http://www.eu-medin.org

GEO: http://earthobservations.org/

Experts welcome to help us evaluate project proposals:
http://www.cordis.lu/experts/fp6_candidature.htm

Thank You for your Attention !